

Chapter 4: Forces

Lesson: Forces, Science and Inertia

The Objectives:

- Students will be able to define and give examples of force.
- Students will be able to describe how the scientific understanding of force developed.
- Students will be able to state and apply Newton's first law of motion.

The Lesson:

1. Student Brainstorming
 - a. What do you think of when you hear the word "force"? (*Pre-assessment*)
2. Definition
 - a. Intuitive Definition: How would you define the word force? (Be careful not to use the word in your definition!) (*Pre-assessment*)
3. History of force (*lecture, emphasis can be changed based on students' answers above*)
 - a. Aristotle
 - i. Natural Philosophy vs. Science
 - ii. Natural force
 - iii. Violent force
 - b. Galileo
 - i. Questioning Aristotle
 - ii. Thought experiments, experimentation and friction
 - c. Newton
 - i. The Laws: Putting it all together by "standing on the shoulders of giants"
4. Newton's First Law
 - a. The First Law: What does it say?
 - b. Inertia: What is it?
 - i. Cart and rolling mass: observing inertia
 - ii. Richard Feynman clip:
<http://www.youtube.com/watch?v=HgAQV05fPEk>
 - iii. With a partner, come up with 3 different examples of where you experience inertia in real life. (*formative assessment*)
 - iv. Discussion of examples (*re-teaching through analyzing what is and is not inertia, developing better examples if needed*)
 - c. Actual Definition of Force
 - d. Homework: Forces, Science & Inertia Worksheet (*summative assessment*)

<p>Beginning the lesson Pre-assessment</p>	<p>Brainstorming: Students have lots of experience with the word “force”, and therefore have preconceived ideas about it (some applicable in physics, others not so much.) Brainstorming about the word can bring those ideas to the forefront.</p>	<p>Intuitive Definition: Once students have created a list of ideas they have about “force”, they can identify which are more scientific and use them to develop a working definition of the word. This allows me to see what they consider “scientific” as well see how well they can use the commonalities of their ideas to create a concise statement about what a concept like force is.</p>
<p>During the lesson Formative assessment</p>	<p>3 examples of inertia: Asking the students to come up with examples of where they see inertia in real life allows them a chance to apply what they just learned. It allows me to see how well they understand what inertia is, based on their examples. Discussing the examples and what is and is not inertia in them can reinforce and readdress the previous parts of the lesson.</p>	
<p>After the lesson Summative assessment</p>	<p>Worksheet: The questions on the worksheet are designed to both review the information in the lesson and have students apply their new understanding in new situations not specifically mentioned in the lesson.</p>	